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The Use of Artificial Intelligence and Digital Technologies in Modern Management

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Abstract. This article examines how artificial intelligence (AI) and related digital technologies are reshaping the core functions of management: planning, organizing, leading and controlling. Drawing on a structured review of the management and information-systems literature, it develops a conceptual framework that links technology capabilities (prediction, automation, augmentation and coordination) to managerial functions and to organizational outcomes. The analysis shows that AI creates the most value when it is used to augment managerial judgment rather than replace it, and when adoption is accompanied by data governance, skills development and changes in organizational structure. The article also identifies the main risks, including algorithmic bias, opacity, employee surveillance and over-reliance on automated recommendations, and proposes a phased adoption model with practical recommendations for managers and policymakers.

Keywords: artificial intelligence, digital transformation, management, decision-making, automation, augmentation, data governance, responsible AI.

1. Introduction

Management has always depended on information: managers collect it, interpret it and turn it into decisions that allocate scarce resources. For most of the twentieth century the limits of this process were set by the cost of gathering and analysing data. Digital technologies (cloud computing, enterprise information systems, mobile connectivity and the Internet of Things) lowered those costs, and recent advances in machine learning and generative AI now extend automation from routine tasks to prediction, content creation and parts of decision support.

This shift raises questions of practical and theoretical importance. Which managerial activities are most affected by AI? Under what conditions does the technology improve organizational performance? How should the roles of managers change, and what new risks must be governed? Existing studies address these questions mostly from a single angle, such as technology adoption, workforce effects or ethics. This article integrates these strands into one framework centred on managerial functions.

The objectives of the study are to: (1) clarify the key concepts and technologies; (2) analyse the application of AI and digital tools across the functions of management; (3) assess benefits, conditions for success and risks; and (4) propose an adoption model and recommendations.

2. Theoretical background and methodology

2.1 Conceptual foundations

Classical management theory, from Fayol's administrative principles to Mintzberg's account of managerial roles, describes management as a set of functions and roles: planning, organizing, leading and controlling, together with interpersonal, informational and decisional roles. Digital technologies act on all of these, but they do so through a small number of mechanisms.

Agrawal, Gans and Goldfarb (2018) argue that the central economic effect of modern AI is the sharp fall in the cost of prediction. When prediction becomes cheap, organizations use more of it, and the value of complementary assets, namely data and human judgment about which

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outcomes matter, rises. Raisch and Krakowski (2021) describe the "automation–augmentation paradox": AI can substitute for human tasks or complement them, and organizations that pursue only one path tend to lose the benefits of the other over time. Vial (2019) frames digital transformation as a process in which digital technologies trigger strategic responses, structural change and new value-creation paths, moderated by organizational barriers and by the way employees respond.

2.2 Method

The study uses a conceptual research design based on a structured literature review. Sources were selected from peer-reviewed journals in management and information systems, well-cited practitioner publications and regulatory or standards documents on AI governance. The material was analysed thematically: applications were grouped by managerial function, and reported benefits and risks were compared across studies. The framework developed here is analytical and should be tested empirically in future work.

3. Key technologies

For the purposes of this article, four groups of technologies are distinguished:

1. **Data and analytics infrastructure:** cloud platforms, data warehouses, business-intelligence tools and enterprise systems (ERP, CRM, HRM) that collect and integrate organizational data.
2. **Machine learning and predictive analytics:** models that forecast demand, detect anomalies, score risk and classify customers or documents.
3. **Generative AI and natural-language tools:** large language models and related systems that draft text, summarize documents, answer questions and generate code or designs.
4. **Automation and connected systems:** robotic process automation (RPA), workflow engines, sensors and IoT devices that execute and monitor processes with limited human intervention.

These groups are complementary. Analytics infrastructure supplies the data on which machine learning depends; generative tools make the output accessible to non-specialists; automation closes the loop by acting on decisions.

4. AI and digital technologies across managerial functions

Table 1 summarizes typical applications by function. Each is discussed below.

Management function	Typical AI and digital applications	Main managerial benefit	Main risk
Planning	Demand and sales forecasting, scenario simulation, market and competitor analysis	Faster, better-informed strategic and operational plans	Overconfidence in model outputs; poor data quality
Organizing	Workflow automation, resource scheduling, project-management platforms, robotic process automation	Lower transaction costs, clearer task allocation	Rigid processes; displacement of roles without redesign
Leading	HR analytics, recruitment screening, learning platforms, engagement surveys, AI assistants	Personalized development, reduced administrative load	Bias, privacy loss, erosion of trust
Controlling	Real-time dashboards, anomaly and fraud detection, predictive maintenance,	Early detection of deviations, continuous control	Excessive surveillance; false positives

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	compliance monitoring		
Cross-functional decision support	Decision-intelligence platforms, generative assistants for analysis and reporting	Speed and breadth of analysis	Opacity and automation bias

Table 1. Applications of AI and digital technologies by managerial function (author's synthesis of the reviewed literature).

4.1 Planning

Predictive models improve forecasts of demand, prices, supply-chain disruptions and financial results by processing larger and more varied data than traditional statistical methods. Scenario tools and simulations allow managers to test strategic options before committing resources. Davenport and Harris (2007) showed that firms competing on analytics outperform peers where analytics is embedded in decision processes and backed by senior leadership. The planning cycle also shortens: continuous rolling forecasts replace annual plans in firms with mature data infrastructure.

4.2 Organizing

Automation reduces the time spent on routine coordination such as approvals, scheduling, invoice processing and reporting. Digital platforms make it easier to organize work across locations and time zones, supporting remote and hybrid structures. However, benefits depend on process redesign: automating an inefficient process mainly speeds up inefficiency. Westerman, Bonnet and McAfee (2014) found that leading digital organizations combine technology investment with strong leadership and clear governance rather than treating digitization as an IT project.

4.3 Leading

In human-resource management, AI supports recruitment, skills mapping, personalized learning and attrition prediction. Generative assistants reduce time spent on drafting and information search; experimental and field evidence suggests productivity gains in writing and customer-support tasks, with the largest improvements for less experienced workers (Noy and Zhang, 2023; Brynjolfsson, Li and Raymond, 2023). For leaders, the more important change is in the character of the role: as analytical and administrative tasks are automated, the comparative advantage of managers moves toward vision, ethical judgment, coaching, negotiation and change leadership. Jarrahi (2018) describes this as human–AI symbiosis, in which machines contribute analytical capacity for complex, uncertain situations, while humans contribute intuition and the ability to handle ambiguity.

4.4 Controlling

Digital technologies enable control to move from periodic, retrospective reporting to continuous, data-driven monitoring. Dashboards, anomaly detection, predictive maintenance and automated compliance checks identify deviations earlier and at lower cost. Kellogg, Valentine and Christin (2020) show, however, that algorithmic management, in which systems direct, evaluate and discipline workers, can intensify control, reduce worker autonomy and generate resistance. Control systems must therefore be designed with transparency, contestability and proportionality in mind.

4.5 Decision support

Across all functions, AI changes how decisions are prepared. Davenport and Ronanki (2018) found that the most successful early business applications of AI were not ambitious "moonshots" but focused projects that improved process automation, insight generation and customer or employee engagement. Decision support works best when managers understand what a model

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can and cannot do, treat its output as an input to judgment and retain accountability for the decision.

5. Results: conditions for value creation

The review yields five conditions that distinguish successful from unsuccessful adoption.

1. **Clear business problem.** Value arises where a specific decision or process is targeted and success is measured with defined indicators, not where technology is adopted for its own sake.

2. **Data quality and governance.** Models are only as reliable as the data behind them. Ownership, quality standards, security and privacy rules must be established before scaling.

3. **Augmentation orientation.** Designs that keep people in the loop and combine algorithmic prediction with human judgment outperform designs that aim for full substitution in complex, high-stakes tasks (Raisch and Krakowski, 2021).

4. **Skills and culture.** Managers need data literacy and the ability to question model outputs; employees need training and a credible account of how their roles will change. Resistance falls when staff participate in design.

5. **Complementary organizational change.** Structures, incentives and processes must be adjusted alongside the technology; otherwise gains remain local and short-lived (Vial, 2019).

6. Risks and governance

The literature highlights several categories of risk that managers must govern actively:

- **Bias and fairness.** Models trained on historical data can reproduce discrimination in hiring, lending or performance evaluation. Regular audits, diverse training data and human review of consequential decisions are needed.
- **Opacity and accountability.** Complex models are hard to explain; organizations must define who is accountable for automated or AI-assisted decisions and provide explanations where people are affected.
- **Privacy and surveillance.** Employee monitoring and customer profiling raise legal and ethical concerns and can damage trust.
- **Automation bias and deskilling.** People may accept system recommendations uncritically or lose skills they no longer practise.
- **Reliability of generative AI.** Generative systems can produce plausible but incorrect content; outputs used in decisions or external communication require verification.
- **Security and dependence.** Digital systems expand the attack surface and can create dependence on a small number of vendors.

Governance frameworks are emerging in response. Floridi et al. (2018) propose ethical principles of beneficence, non-maleficence, autonomy, justice and explicability. The NIST AI Risk Management Framework (2023) offers a voluntary approach structured around governing, mapping, measuring and managing AI risks, and the European Union's Artificial Intelligence Act (Regulation (EU) 2024/1689) introduces risk-based legal obligations for AI systems, including requirements for high-risk uses such as employment decisions. Organizations operating internationally should expect growing regulatory requirements and plan compliance accordingly.

7. A phased adoption model

Based on the findings, a four-phase model is proposed for organizations introducing AI and digital technologies into management:

Phase	Focus	Key actions	Indicator of readiness
1. Foundation	Data and governance	Inventory data sources, set quality and security standards, appoint data owners, adopt an AI-use policy	Reliable, accessible core data; defined accountability

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2. Pilot	Targeted use cases	Select two or three high-value, low-risk processes; define metrics; involve end users	Measurable improvement against baseline
3. Scale	Integration	Embed tools in workflows, redesign processes and roles, train managers and staff	Stable operation across units; user adoption
4. Optimize	Continuous improvement	Monitor performance and bias, update models, review strategy and ethics regularly	Sustained value; documented oversight

Table 2. Phased model for adopting AI and digital technologies in management.

8. Recommendations

For managers. Begin with business problems rather than tools; invest in data literacy; treat AI output as advice to be tested; keep accountability for decisions with identifiable people; and communicate openly with employees about how technology will change their work.

For organizations. Establish cross-functional governance that includes IT, legal, HR and business units; maintain an inventory of AI systems and their risk levels; run regular audits for bias, accuracy and security; and fund reskilling alongside technology spending.

For policymakers and educators. Develop proportionate regulatory frameworks that protect individuals without suppressing innovation; support digital infrastructure and skills programmes, particularly for small and medium-sized enterprises; and update business-school curricula to combine management theory with data and AI competencies.

9. Limitations and directions for future research

This study is conceptual and relies on secondary sources; the proposed framework and adoption model have not been tested empirically. The pace of technological change, especially in generative AI, means that evidence on long-term effects is still limited. Future research could examine, through case studies and quantitative designs, how AI affects managerial work and performance in different industries and national contexts, including emerging economies; how employees perceive algorithmic management; and which governance mechanisms are most effective in practice.

10. Conclusion

Artificial intelligence and digital technologies are changing every managerial function by making prediction cheaper, automating routine coordination and enabling continuous monitoring. Their benefits are real but conditional: they depend on a clear problem focus, trustworthy data, an augmentation-oriented design, skilled people and complementary organizational change. At the same time, they introduce risks of bias, opacity, surveillance and over-reliance that require deliberate governance. Managers who combine technological literacy with sound judgment and ethical responsibility are best placed to turn AI from a source of efficiency gains into a source of lasting organizational capability.

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